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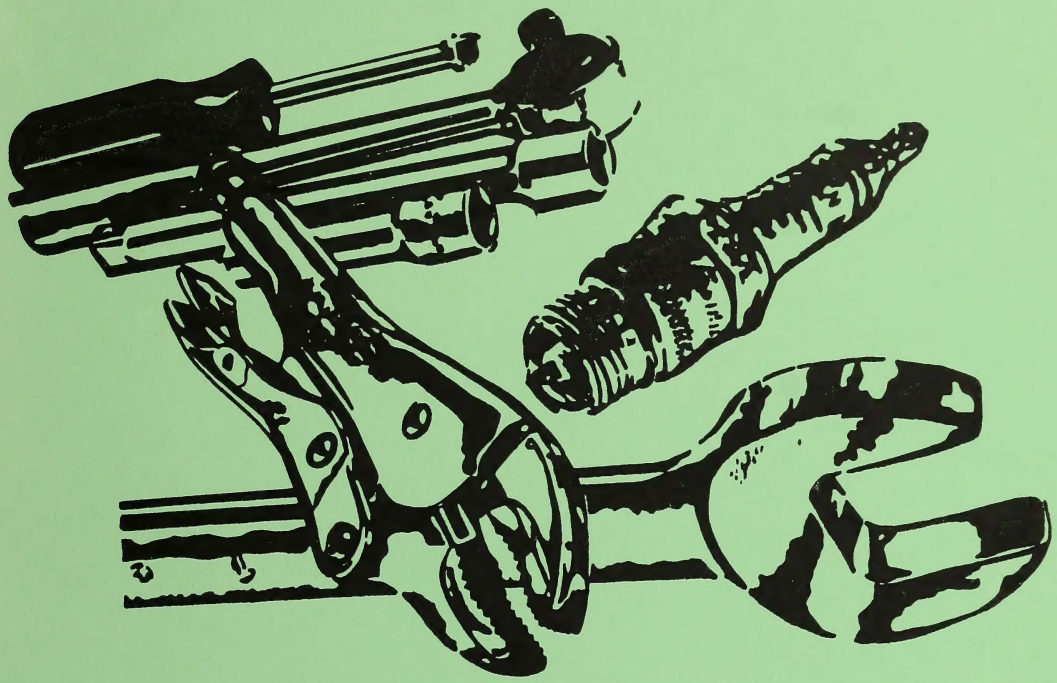
SCHOOL BUS DRIVER IMPROVEMENT PROGRAM



SERIES 2

SCHOOL BUS INSPECTION AND MAINTENANCE

Alberta
TRANSPORTATION

SERIES 2

SCHOOL BUS INSPECTIONS AND MAINTENANCE

SERIES 2

SCHOOL BUS INSPECTIONS AND MAINTENANCE

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2.1

THE PRE-TRIP INSPECTION

2.1 THE PRE-TRIP INSPECTION

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OBJECTIVE

Given a functional school bus, be able to conduct a pre-trip inspection of the bus which includes at least the following:

1. Under the Hood

   - oil level
   - windshield washer fluid level
   - condition/tension of fan belt
   - hoses and connections
   - radiator coolant
   - battery terminals
   - general appearance

2. Exterior

   - general appearance/lettering
   - windshield and wipers
   - lights and signals
   - exhaust system
   - tires and wheels
   - emergency door
   - mirrors

3. Interior

   - signals and flasher indicators
   - gauges and controls
   - mirrors
   - defroster
   - windshield wipers and washer
   - horn
   - emergency equipment
   - emergency door
   - seats and passenger compartment

Be able to complete the inspection without omitting any items or steps or failing to recognize any mechanical problems, and correctly complete a Pre-Trip Inspection Checklist, making brief written notes of difficulties or malfunctions you encounter.

You can also have a direct effect on fuel economy of your bus by your driving and your timely comments to the maintenance staff to help them maintain your bus in peak working condition.

Sample Skill Check: Look again at Sample Skill Check, p. I of green segment of the Student Question and Answer Section, before you begin module.

INTRODUCTION

When you are driving a school bus, there is a lot at stake: the safety of you, your passengers, and other road users. It is essential, therefore, that your bus is maintained in sound working order.

Regardless of the engineering skill or workmanship incorporated in a school bus, it cannot continue to deliver maximum safety, economy, and dependability unless it is properly maintained. Although the repair of school buses is wisely left to skilled mechanics, you can do much to aid them in locating any trouble, and often prolonging the life of the vehicle by doing routine maintenance tasks and conducting daily inspections. As the driver, you probably will know your school bus better than anyone else and are the one most likely to notice faulty or abnormal operation. Consequently, the mechanics must rely heavily on you to detect any mechanical problems and report them promptly.

This module focuses on the daily pre-trip inspection, a very crucial part of an overall school bus maintenance program. The pre-trip inspection will require about 5-10 minutes of your time in the morning, and as with any "preventive medicine" program, the long term savings in human and dollar terms can be enormous.

The daily pre-trip inspection can be thought of as three basic parts:

1. The Walk-Around
   - under the hood
   - exterior check

2. Interior Inspection and Engine Start-Up

   - general condition of the interior
   - gauge check with engine running
   - switch and light check (interior)

3. Outside Light and Signal Check

The Course Manager will demonstrate the proper method of conducting the complete pre-trip inspection. It is also discussed on the following pages. Much of the pre-trip inspection may seem self-evident to you, or you may wonder about the necessity of "really doing all this every day". Without trying to be redundant, the time spent on pre-trip inspections is well spent and it really does pay off.

PRE-TRIP INSPECTION PROCEDURES

The pre-trip inspection gets its name from the requirement to inspect the bus on a daily basis - before operating it. In some school jurisdictions, however, it is not mandatory that the inspection be conducted before the day's run, so long as it is carried out at some point during the day. There are a couple of advantages to conducting the inspection first thing in the morning, though, and we'd like to stress them.

1. It may be easier to spot some signs of trouble while the bus is still in the position it has been resting all night. For example, an oil leak would be more noticeable due to the pool that would accumulate on the ground.

2. Once out of the way, you needn't concern yourself to the same extent at the end of the day, when you're probably tired anyway.

It is important that the same inspection procedure be used each day, and that problems be recorded. On the following page is a sample pre-trip checklist, and the less you deviate from it, the less likely you are to omit important steps. Making a written record (and this takes practically no time at all!) and submitting it to your fleet supervisor does much to eliminate possible oversight or forgetfulness and has resulted in substantial cost savings where this procedure has been followed.

SUGGESTED SCHOOL BUS DRIVER PRE-TRIP INSPECTION FORM

Driver's name _____ **Bus number** _____

Week ending _____ **Odometer Reading** _____

___ **OK** ___ **Needs Attention** ____ **Adjustment Made** ____ **Not Equipped**

	MON.	TUE.	WED.	THU.	FRI.
1. Under the Hood					
- oil level					
- coolant level					
- fan belt					
- hoses					
- wire connections					
- battery					
- general appearance (no undue oil, grease,coolant)					
2. Exterior Inspection					
- windshield, mirrors, front windows					
- exhaust - tailpipe clear?					
- rear emergency - open and close?					
- bump tires - OK? Lug nuts in place					
- drain air brake tank					
- general outside appearance - clean for school bus identification					
- under the bus					
3. Interior Inspection					
- seats, floor - housekeeping					
- emergency door-open and close, rear door,					
- roof, windows					
- emergency equipment					
- fire extinguisher - pressure					
- first aid kit - intact					
- driver's area - windshield, windows clean?					
4. Engine Start-Up					
- vacuum or air pressure gauge					
- oil pressure warning light					
- oil pressure gauge					
- service brake warning light					
- alternator/generator warning light					
- ammeter					
- water temperature gauge or warning light					
- fuel gauge					
- interior and step-well lights					
- steering - feel OK?					
- horn, defroster and heater blower, windshield wipers					
- brakes-pedal height and feel. parking brake, release reset					
5. Outside Light and Signal Check (turn on all lights before leaving bus)					
- turn signals					
- 4-way emergency flashers					
- alternately flashing lights					
- headlights					
- stoplights/tail lights					
- clearance lights					

6. **On-the-Road Check**
   - parking brake
   - brakes
   - transmission
   - clutch
   - engine
   - steering
   - suspension

MON.	TUE.	WED.	THU.	FRI.

Now let's spend a bit of time running through some of the details of the pre-trip inspection. The on-the-road check, at the bottom of the list, will be considered separately, as the subject of Module 2.2.

UNDER THE HOOD

Before boarding and starting the bus, take a quick overview, beginning with an under-the-hood check. Open up the engine compartment and check the following:

- oil level
  - should be above the line on the dipstick which indicates "add", but not over the line indicating "full".

- level of coolant in the radiator
  - should be to the mark on the radiator tank. If no mark, 2.5 cm from the filter neck is OK.

- fan belt
  - not frayed or badly worn; should have 1.5 cm or less tension.

- hoses
  - no cracks or tears; all connections secure

- wire connections
  - appear tight and secure

- battery
  - no corrosion around the battery terminals

- general appearance
  - no grease or oil spills or signs of coolant which would indicate leakage.

When satisfied everything is as it should be, close the hood. To see how well you have absorbed the material to this point, try the Review Questions on p. III of the green segment of the Student Question and Answer Section.

EXTERIOR INSPECTION

After inspecting the engine compartment, and while you are still outside, give the exterior of the bus a quick check. You might find the diagram on the next page (a copy of which is available for future use in the Bus Driver Course Question Book) useful for this purpose. This inspection should include:

- WINDSHIELD, MIRRORS, FRONT WINDOWS. All school bus windows should be clean and it is essential the driver's vision is not impaired. In inclement weather, be sure all road film, snow, and ice are removed. In sunny weather or at night, any dirt or film on the windshield can cause dangerous glare. Mirrors should be checked to be sure they are clean and tightly adjusted.

  NOTE: In winter, recheck the rear of your bus at your first stop and remove any snow which may have blown off the roof and is obscuring the windows, lights or signs.

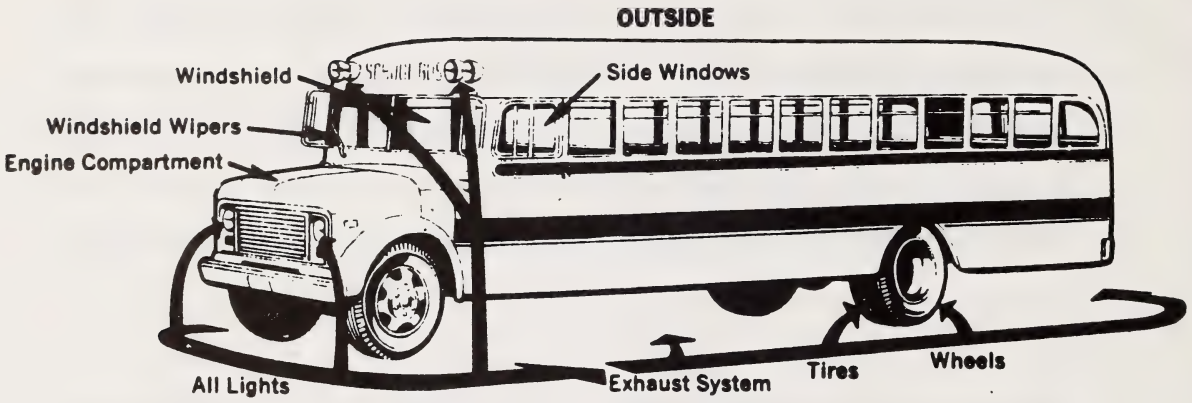
- TIRES. Underinflated, flat, worn excessively, or damaged. Don't drive until they are all OK. One flat rear tire, for example, can place a dangerous weight on the companion tire of a dual set. To check the tires, tap each with a tire iron or similar implement. The blow should sound deep and hollow.

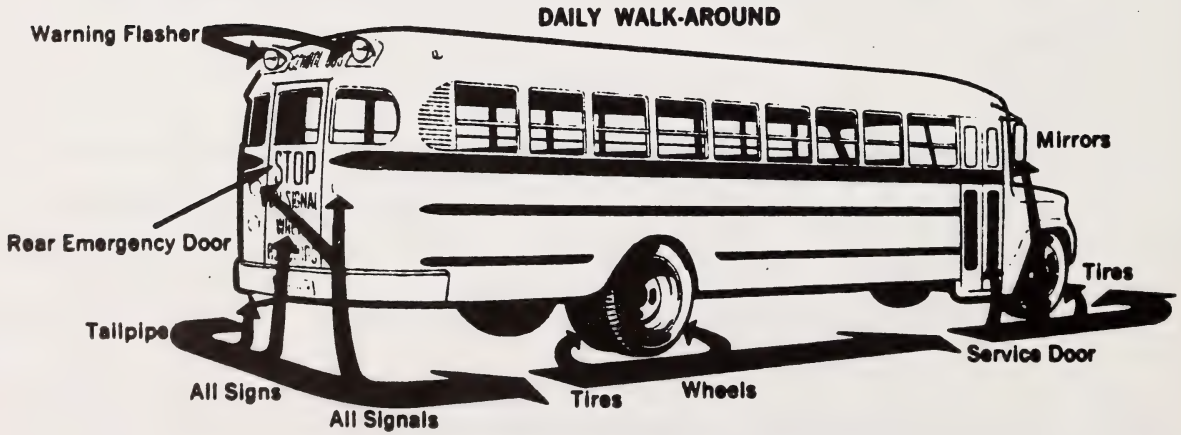
- WHEELS. Look for loose or missing wheel nuts, cracks, or a rim of rust or washed-out water coming from the bolt. A solid seal of dust between the nut and the wheel will give you a pretty good idea that the nut is secure. Don't drive with a damaged wheel or loose wheel nuts.

EXTERIOR INSPECTION

AND

OUTSIDE LIGHT AND SIGNAL CHECK





- UNDER THE BUS. View carefully the area of ground beneath the bus and on the inner walls of the wheels for indications of fluid leaks, which could point to potential problems. Leaks could include engine oil, water or coolant, brake fluid, fuel, transmission, clutch, or axle fluid or grease. If a leak is spotted, the fleet supervisor or mechanic should be notified promptly.

- EXHAUST SYSTEM. While checking under the bus, look carefully for sagging exhaust pipes and tailpipes and mufflers. With any sign of trouble, wait until the bus is started and look for visible exhaust and listen for excessive noise. A cloth held over the tailpipe will make leaks in the system visible, and these should be reported immediately because of the danger of carbon monoxide poisoning.

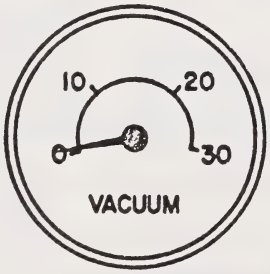
- GENERAL OUTSIDE APPEARANCE. Look generally over the outside of the bus to make sure school bus identification is visible and there is nothing that may not have been there yesterday. It's unlikely you'll notice anything, but you shouldn't overlook the possibility of vandalism.

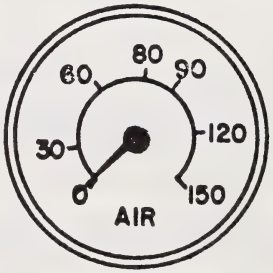
OK, when that's finished, head into the bus to inspect the interior.

INTERIOR INSPECTION AND ENGINE START-UP

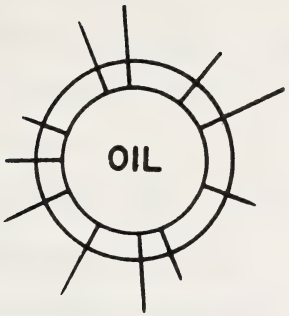
Your first task on boarding the bus every morning is a quick overview to make sure everything - emergency doors, floors and driver's area, emergency equipment - is in order. This is easily done, so it will not be discussed here, but it SHOULD NOT BE OMITTED. Requiring greater explanation is the functioning of the engine and various mechanical and electrical systems. So, start the motor and see how things are operating. All gauges must be functioning and giving "normal" readings or you shouldn't operate the bus. Remember to keep idle time to a minimum.

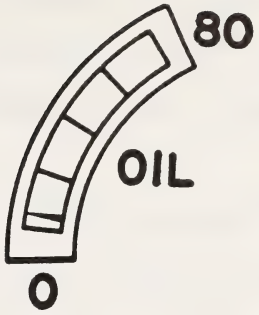
- VACUUM OR AIR PRESSURE GAUGE. These should indicate adequate capacity to operate your brakes. Don't operate the bus until the "reserve" vacuum or air reaches the manufacturer's minimum recommendations. Excessive loss of pressure, overnight, can indicate a leak in the air system. Any excessive loss should be reported immediately.





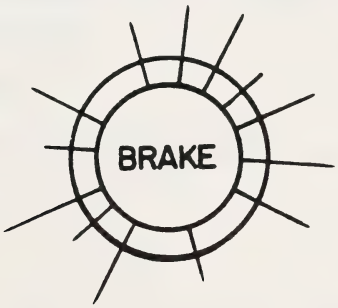
- OIL PRESSURE WARNING LIGHT. This light may go "on" as the bus is being started, but should go "off" right after the engine starts. If it does not, turn off the engine and report immediately.





- OIL PRESSURE GAUGE. (Instead of warning light). It should indicate adequate pressure. If not, the engine should be turned off. Report immediately, and do not drive the bus. Adequate pressure will vary so check the manufacturer's specifications for that vehicle to be sure of what the reading should be.

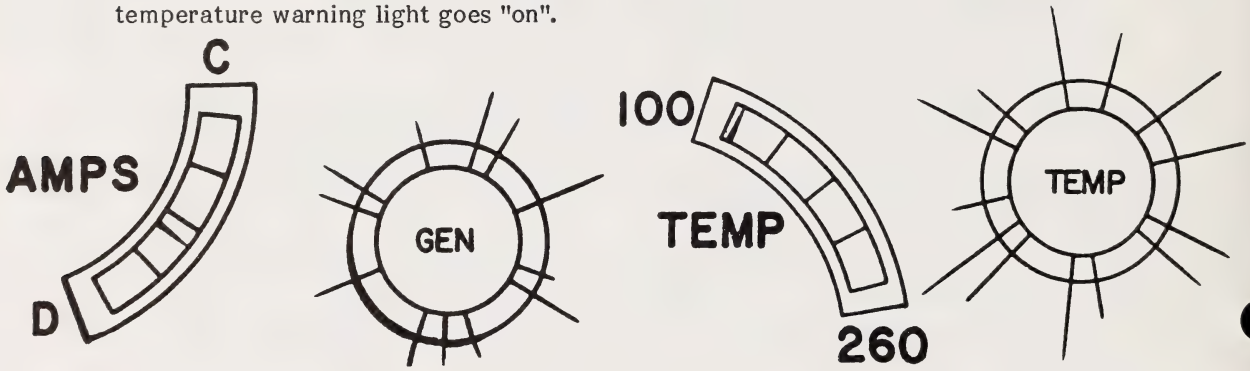
- SERVICE BRAKE WARNING LIGHT. In a vehicle equipped with a dual brake system, if this light comes "on" during a hard brake application, this could indicate that at least one of the brake systems is not operating properly.



- ALTERNATOR/GENERATOR WARNING LIGHT. If this light remains "on" after the engine is running, it indicates a malfunction in the charging system. Do not operate the bus. Report at once.

- AMMETER. (Instead of Alternator/Generator Warning Light). It should not continue to show a discharge after the engine is running. If it continues to indicate a discharge, stop the engine and report at once.

- WATER TEMPERATURE GAUGE or WARNING LIGHT. These instruments show the temperature of coolant in the engine. If your bus has a gauge, the indicator should read "cool" or "warm". When it indicates "hot", the engine should be stopped immediately and the problem reported. The same action should be taken if the temperature warning light goes "on".



- FUEL GAUGE. It should indicate a safe margin of fuel for the day's operation (never less than 1/4 full).

Check to determine if the switches and indicators for each of the following are functioning properly:

- directional turn signals
- four-way hazard flashers
- alternately flashing lights
- stop lights
- running lights
- head lights

Also ensure that the following are operational/accessible:

- interior compartment lights
- windshield wipers
- horn
- heater/defroster
- rear view and side view mirrors
- convex cross over mirror
- driver's seat belt

OUTSIDE LIGHT AND SIGNAL CHECK

Whatever you happen to find inside in connection with the warning systems, it is important you check outside as well (refer to diagram). This includes:

- turn signals
- four-way emergency flashers
- alternately flashing lights
- head lights (high and low beam)
- stop lights/tail lights

Well, there you have it. To test your knowledge of this material, turn to p. VI in the green segment of the Student Question and Answer Section. There, you will also find a practice session to help you hone your skills before taking the Overall Skill Check, on p. IX.

Note to Drivers of Propane Powered Buses:

If you have a propane powered school bus, a few additional items require checking as part of your walkaround.

Under the hood, check to see that none of the hoses are rubbing on anything or resting across something hot.

During your exterior check, make the following observations:

- Ensure the tank's mounting brackets are tight
- Ensure the dust cap is on and secure
- Check the shut off valve to ensure that it is not seized.

During your interior check, be sure you have sufficient fuel for the day's run. Propane will give a 10-15% reduction in fuel range. This may cause problems if you have a long run and attempt to complete it on less than a full tank. Familiarize yourself with the propane fueling procedure to ensure all safety precautions are taken.

2.2

THE ON-THE ROAD OPERATING CHECK

2.2 THE ON-THE-ROAD OPERATING CHECK

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OBJECTIVE

Given a functional school bus, be able to conduct an on-the-road operating check of the steering, brakes, clutch, transmission and engine, and determine if the bus is operating safely and properly. In conducting the operating check, no steps in the check will be omitted, and any key symptoms of a mechanical malfunction or problem related to the items in the check will be recognized and documented in a brief written report (you can and should use your school jurisdiction's repair request form, if it has a specific one).

Sample Skill Check: Before you start Module 2.2, look at Sample Skill Check, p. X again.

"ON THE ROAD" CHECKING PROCEDURES

A planned road check, en route to your first pick-up, will give you a chance to evaluate the steering, suspension, clutch, transmission, and other components. You also can determine whether the engine performs properly under load ... and if the brakes provide you with adequate stopping power.

The following is a suggested procedure for road-checking the vehicle and the signs of trouble you should be alert to. It can be accomplished on the way to pick up your first passengers.

1. Test the Parking Brake Lever

To check the effectiveness of the parking brake (both mechanical and air), slowly engage the clutch while the parking brake is "on". If the bus moves easily, the parking brake is not holding properly and should be repaired. **ALWAYS RELEASE THE PARKING BRAKE BEFORE STARTING OUT.** Driving with the parking brake "on" is the most frequent cause of parking brake failure.

Alternatively, for vehicles without air brakes, begin to accelerate the bus slowly until the bus is travelling 8-16 km/h. Gradually apply the parking brake and bring the bus to a complete stop. If the bus will not stop easily, the parking brake should be repaired.

In air brake systems, the parking brake (emergency brake) will remain applied if air pressure falls below 310-345 kPa (45 - 50 psi).

2. Check Transmission Operation

With the transmission engaged in either a forward or reverse position, the bus should start out smoothly in response to depressing the accelerator pedal and the transmission should not produce any unusual metallic noises. An automatic transmission should not "slip" and a manual transmission should allow for easy and smooth gear changes throughout the entire shifting range. You may not be aware of "slippage", but be sure to report shifting difficulty to your maintenance supervisor.

NOTE: Do not exceed the manufacturer's recommended road speed for each specific gear range - exceeding speed recommendations could damage the transmission or reduce its service life.

3. Check the Clutch

The clutch should engage easily and smoothly without jerking, slipping excessively, or "chattering". A properly adjusted clutch should have some "free play" (3 1/2 cm.) when the pedal is fully released. (Report any unusual clutch pedal operation to your maintenance supervisor). Never "ride" the clutch pedal. Once the shift has been made, the foot should be removed from the clutch pedal. While changing gears, an experienced driver will carefully control the speed of his engine so that the shift may be complete without jerking or excessive clutch slippage. Erratic or careless shifting of gears wears out the clutch and reduces its service life.

4. Check the Brakes

Don't wait until you are out on the highway to check the brakes. Test them at low speeds - bring the bus to a complete stop. Your bus should stop in a "straight line" ... without skidding, swerving, or pulling to one side. The brakes should not grab or lock, or make excessive noise. Report any excessive pedal pressure or abnormal or unusual braking behaviour. If the condition prevents safe braking, do not operate the bus until the condition has been repaired. Note the air pressure or vacuum gauge periodically to be sure that adequate pressure is maintained.

5. Check the Engine

Be alert to any unusual engine noises, vibrations or lack of normal response. Be sure to report any unusual engine behavior to the maintenance team.

Never race a cold engine. Instead, increase speed slowly so that all parts may be properly lubricated. Never exceed the maximum rpm (revolution per minute) recommended by the manufacturer.

6. Check the Steering

Is it responsive? Does there appear to be too much "play" or "jerking" in the steering system? Is the power steering quiet? Does the bus steer easily? Does it go precisely where you steer it? Is steering steady in turns - and when going over bumps? Report any unusual or substandard steering conditions.

7. Check the Suspension

Does one end of the bus "sag"? Is there excessive "bounce" or does the bus "bottom" when going over bumps or chuckholes? Does it "weave" or "sway" excessively when turning corners or on curves? It may be due to broken springs or faulty shock absorbers. Report any unusual ride or handling characteristics.

The alert school bus driver is always alert to the condition of his bus while driving and quickly recognizes unusual noises or abnormal handling characteristics.

Not all drivers have (or will ever have) the ability to spot every problem. But the best school bus drivers make a thorough stationary and operating inspection of their bus every day. They continue to check all systems throughout the day - knowing that the condition of the bus can change as the day progresses. To them, "inspection" becomes an integral part of "driving", and they are always alert to any warning signal which tells them something is wrong. This continued alertness permits them to spot trouble and act accordingly, before that trouble causes serious damage - or contributes to a breakdown or collision.

Further monitoring fuel usage is an essential part of fuel management. The Alberta Energy and Natural Resources "Truck Save Calculator and Log" could be used to record fuel consumption and improve fuel efficiency.

Following is an On-the-Road Operating Check Points list which summarizes the requirements of the on-the-road operating check. An additional copy is located in the Bus Driver's Course Question Book for your future reference. Look this over (it is number six of the School Bus Driver Inspection Form), then do the Review Exercise on p.XI of the green segment of the Student Question and Answer Section, and, when you are ready, the Overall Skill Check, on p. XIII.

ON-THE-ROAD
OPERATING CHECK POINTS

1. PARKING BRAKE

- o holds properly
- o release before driving

2. TRANSMISSION

- o smooth acceleration; no slippage
- o easy gear changes
- o unusual noises

3. CLUTCH

- o jerking, slipping, chattering
- o adequate "free play"

4. BRAKES

- o stops without skidding, swerving, pulling
- o does not grab or lock
- o unusual noises

5. ENGINE

- o unusual noises, vibrations

6. STEERING

- o responsiveness, precision
- o jerking, too much "play"

7. SUSPENSION

- o sag, sway
- o bottom-out

2.3

DAILY AND WEEKLY

MAINTENANCE TASKS

2.3 DAILY AND WEEKLY MAINTENANCE TASKS

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OBJECTIVE

Using a school bus from your jurisdiction's fleet, be able to check over the bus after a daily trip and perform any maintenance or cleaning tasks which are necessary to get the bus in clean, safe, working order for the next day. Also be able to perform those maintenance and cleaning tasks that are required to be carried out on a weekly basis to properly maintain the bus. In carrying out both the daily and weekly tasks, make a brief written note of any damage to the bus or misplaced articles found to be passed on to the fleet supervisor.

Sample Skill Check: Before you start Module 2.3, look at Sample Skill Check, p. XIV in the green segment of Student Question and Answer Section.

INTRODUCTION

Carrying a large number of energetic passengers twice a day, five days per week during the school year, it is understandable that a school bus suffers a great deal of wear and tear. Consequently, in addition to conducting pre-trip inspections and operating checks, a good overall maintenance program must include the performance of daily and weekly maintenance and cleaning tasks by the driver.

There are several important reasons why it is important to keep your school bus in clean, sanitary condition, including:

- to safeguard the health of the students.

- to reduce the possibility of injuries to students that might be caused by falling over misplaced objects or slipping on the floor.

- to induce a better attitude among the students. If the driver takes pride in keeping his vehicle clean, the children are more likely to respond in the same manner.

- to give the general public a favourable image of the school and school transportation system. The school bus is about the only visual contact many people have with the school system. If they see a clean, well maintained school bus, it will give them a favourable impression of the school as a whole. A dirty, poorly maintained bus will have just the opposite effect.

- to prolong the life of the bus.

- to reflect the pride you have in your job.

This module is structured into two short parts: (i) post-trip maintenance tasks, and (ii) weekly maintenance tasks, based on the time requirements for performing each. If your school jurisdiction has adopted a different procedure or other requirements, all well and good. The important thing - as you can appreciate - is that these tasks be performed to ensure the proper maintenance of the buses.

POST-TRIP MAINTENANCE TASKS

After you have completed your daily run, even though you are probably tired, there are a few things you should attend to that will ensure that the bus is maintained in clean, sanitary, and operational condition. And they only take a few minutes to do!

1. Check the inside of the bus for mislaid books and clothing, etc., and store them to be returned to their owners on the next trip.

   (Note that there is some overlap here with part of the interior pre-trip inspection. If you do a thorough job in the afternoon, it pays off the next day by making your pre-trip inspection easier).

2. Sweep the floor of the bus, being especially careful to sweep water on the floor out of the bus in the winter time to prevent freezing.

3. Sweep off the steps of the bus.

4. Check the seats and sides of the bus for damage, pen marks, etc. Clean any markings off.

5. Ensure that the alternately flashing lights (for loading and unloading) are switched off.

6. Check that all electrical switches are off to help prevent the battery from going dead.

7. Fill the gas tank for the next day's run (as many times per week as necessary) and complete the fuel usage log. (Depending on the circumstances in your school jurisdiction, it may be appropriate to fill the tank at an authorized location immediately following your morning run). Never fuel the bus with passengers on board. Overfilling tanks can lead to fuel spillage due to fuel heating up and expanding when vehicles are left standing in the sun or in a warm area.

And that completes the requirements for daily maintenance and inspection by a school bus driver. The performance of these tasks every school day is of fundamental importance to the maintenance of the school bus fleet and the safety of all passengers. This cannot be overstressed!

WEEKLY MAINTENANCE TASKS

There are several cleaning and maintenance tasks which are required, but it is not practical or effective to do them daily. And while you may be able to put off doing some of them for quite a while, it is strongly recommended that they be performed on a weekly basis.

The basic requirements of weekly cleaning and maintenance are:

1. Wash the floor using a disinfectant and mop.
2. Scrub all parts of the seats with soap and warm water.
3. Wash windows and sills.
4. Check operation of windows.
5. Clean interior lights.
6. Wipe off all interior surfaces not otherwise cleaned.
7. Check condition of first aid kit, fire extinguisher, and emergency flares, reflectors.
8. Repair minor damages to interior of bus.
9. Check outside of bus for dents and scratches.
10. Clean all exterior lights and mirrors.
11. Clean license plates.
12. Follow the established procedure for having the bus serviced on a scheduled basis.
13. Check fuel usage record for abnormal changes.

There, you have it! Rather than spend more time telling how important it is to do these things, we'll trust that you already realize the importance. When you are ready, proceed to the Skill Check, on p. XV in the Student Question and Answer Section.

This material was prepared by Alberta Transportation for use by drivers who are involved in pupil transportation.

For additional information contact: **Alberta Transportation**
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T6B 2X3 **427-7914**

Private citizens can place long distance calls free of charge - Dial 0 and ask the A.G.T. Operator for Zenith 2-2333. This will connect you to the closest R.I.T.E. Centre.